

NAME <b>George K. Francis</b>	POSITION TITLE <b>Professor of Mathematics U Illinois at Urbana-Champaign</b>
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INSTITUTION	DEGREE	YEAR	FIELD OF STUDY
University of Notre Dame	BA mcl	1958	mathematics
Harvard	AM	1960	mathematics
University of Michigan	PhD	1967	mathematics
Universitty of Michigan	postdoc	1967	mathematics

#### POSITIONS AND EMPLOYMENT

2005-	Prof. Beckman Institute	University Illinois
1990-	Prof. Campus Honors Faculty	University Illinois
1989-	Prof., later Senior Research Fellow	NCSA
1982-	Professor	University Illinois
1973-1981	Associate Professor	University Illinois
1968-1972	Assistant Professor	University Illinois
1968-1969	Lloyd Post Doctoral Fellow	University Michigan
1965-1967	Teaching Fellow	University Michigan
1964-1965	Lecturer	Newton College, MA
1963-1965	Lecturer	Boston College, MA
1962-1963	Lecturer	Regis College, MA
Summer 1961	High School Teacher	Pomfret Prep School, CN

#### REPRESENTATIVE, PEER-REVIEWED PUBLICATIONS

George K. Francis, *The folded ribbon theorem: a contribution to the study of immersed circles*, Trans. Amer. Math. Soc. 141(1969), p.271-303. MR 39 4863 (M. Marx).

George K. Francis and Robert Bohrer, *Sharp one-sided confidence bounds for linear regression over intervals*, Biometrika 59(1972), p.99-107. MR 50 15187.

George K. Francis and Robert Bohrer, *Sharp one-sided confidence bounds over positive regions*, Ann. Math. Statist. 43(1972), p.1541-1548. MR 49 11714 (P. Mielke).

George K. Francis, *The maximum principle for control distributions*, Ann. Math. Pur. Applic. 94(1973), p.107-118. MR 49 1288 (M. Jacobs).

George K. Francis, *Canonical representations of optimal control problems*, J. Math. Anal. Applic. 44(1973), p.779-785. MR 49 11356 (S. Chow).

George K. Francis *Branched and folded parametrizations of the sphere*, Bull. Amer. Math. Soc. 80(1974), p.72-76. MR 50 3245 (P. Church).

George K. Francis and Stephanie Troyer, *Continuation: excellent maps with given folds and cusps*, Houston J. Math. 8(1982), p.53-60.

George K. Francis, *A Topological Picturebook*. Springer-Verlag, New York, 1987. Second printing, 1988. Japanese translation, Springer-Tokyo, 1991. Russian translation, MIR, Moscow, 1991. Chinese facsimile authorized paper edition, 1991, Japanese PB edition, Springer, Tokyo, 2006, English PB edition, Springer, NY, 2006.

George K. Francis *The Etruscan Venus*, in P. Concus, R. Finn, and D. Hoffman, editors, *Geometric Analysis and Computer Graphics*, Springer-Verlag, New York, (1991).

George K. Francis with Brent Collins, *On Knot-spanning surfaces*, Leonardo, Special Issue on Visualization in Mathematics, Sept./Oct., (1992).

George K. Francis and Louis H. Kauffman, *Air on the Dirac strings*. In W. Abikoff, J. Birman, and K. Kuiken, (Eds.) *The Mathematical Legacy of Wilhelm Magnus*, Contemporary Mathematics, Vol. 169, Amer. Math. Soc., Providence, RI, 1994, p.261-276.

item[] Andrew J. Hanson, Tamara Munzner, George Francis, *Interactive methods for visualizable geometry*. Cover article, Computer, Membership Magazine of the IEEE Computer Society, Vo. 27, No. 7, July(1994), p. 73-83.

George K. Francis, *The hypergraphics honors seminar at Illinois*. In Dave Thomas (Ed.) *Scientific Visualization in Mathematics and Science Teaching*. Assoc. Adv. Computing in Educ., Charlottesville, VA, 1995.

George Francis, Ken Brakke, Rob Kusner, Dennis Roseman, John M. Sullivan, Ulrike Axen, Alex Bourd, Glenn Chappell, Chris Hartman, Paul McCreary, Jason Rubenstein, Will Scullin). *LATERNAmatheMAGICA, GII Testbed and HPC Challenge Applications on the I-WAY*, eds. Holly Korab and Maxine D. Brown, Published by ACM/IEEE Supercomputing 95, 1995, p 43.

George K. Francis, John M. Sullivan, Robert B. Kusner, Kenneth A. Brakke, Chris Hartman, Glenn Chappell, *The Minimax Sphere Eversion*. In Konrad Polthier and Hans-Christian Hege, eds., *Mathematics and Visualization I*. Springer Verlag, Berlin, 1997. pp 3-20.

George K. Francis and Jeffrey R. Weeks, *Conway's ZIP Proof*. American Mathematical Monthly. Mathematical Association of America. vol 106 (May 1999), pp 393-399.

George K. Francis, *Metarealism in Geometrical Computer Graphics*. In David Salesin and Carlo Séquin, eds., *Mosaic 2000: Millennial Open Symposium on the Arts and Interdisciplinary Computing*. University of Washington, 21-24 August 2000. pp 1-12. Expanded to: *Metarealistic Rendering for Real-time Interactive Computer Animation*, in Michele Emmer, ed., *Visual Mind 2*, MIT Press, 2004.

George Francis, Camille Goudeseune, Henry Kaczmariski, Benjamin Schaeffer, John M. Sullivan, *ALICE on the Eightfold Way: Exploring Curved Spaces in an Enclosed Virtual Reality Theater (CUBE)*, in Hans-Christian Hege and Konrad Polthier, eds., *Visualization and Mathematics III*, Springer Verlag, 2003, p.304-316.

Benjamin Schaeffer, Peter Brinkmann, George Francis, Camille Goudeseune, Jim Crowell, Hank Kaczmariski, *MYRIAD: Scalable VR via Peer-to-Peer Connectivity, PC Clustering, and Transient Inconsistency*. Proceedings of Virtual Reality Software and Technology 2005, Monterey, CA, p. 68-77. Expanded version, to appear in *Computer Animation and Virtual Worlds*, Wiley Inter Science.

#### PUBLIC VIRTUAL ENVIRONMENTS

George K. Francis, Daniel Sandin, Randy Hudson, Charles Gunn, *Mathenautics, Three-Eighth of Thurston's Eightfold Way*. CAVE-Virtual Reality Room, SIGGRAPH'92

with Daniel Sandin, Louis Kauffman, Chris Hartman, Glenn Chappell. *Air on the Dirac Strings*. 2.0' video in Electronic Theater, SIGGRAPH'93.

with Chris Hartman, Glenn Chappell, Ulrike Axen, Paul McCreary, Alma Arias, Joanna Mason. *Post-Euclidean Walkabout*. CAVE - Virtual Reality Room, SIGGRAPH'94.

with Dan Sandin, Milana Huang, Lou Kauffman, Joanna Mason. *Getting Physical in Four Dimensions*. CAVE - Virtual Reality Room, SIGGRAPH'94

with John Sullivan, Ken Brakke, Rob Kusner, Dennis Roseman, Alex Bourd, Chris Hartman, Glenn Chappell, Jason Rubenstein. *Laterna matheMagica: a 4-D Stereopticon*. CAVE-GII Testbed, Supercomputing'95.

with Alex Bourd, Scott Banister, Chris Hartman, Shankar Subramanian, Eric Jakobsson, and Markus Wagner. *Cellular Semiotics*. Immersadesk, Supercomputing'95.

with Alex Bourd and Ulises Cervantes-Pimentel. *Real Time Interactive Gravitational Lensing*. "Partnerball" on the DuoDesk, NCSA Partner's Meeting, May (1998), and "Superball" on CAVE-DuoDesk at Supercomputing98.

with John Sullivan, Stuart Levy, Camille Goudeseune, Jeff Carpenter. *The Optiverse*. 2' video in Electronic Theater, SIGGRAPH 98. 6' video in Videomath Festival, Int. Congr. Math., Berlin, (1998).

with Donna Cox, Bob Patterson, Stuart Levy, et al. *The Big Bang Theater show*. Hayden Planetarium Rose Center of the American Museum of Natural History. New York, (2001-?).

#### FUNDED AND UNFUNDED SYNERGISTIC ACTIVITIES:

Teaching college since Notre Dame summerschool, 1957.

Founding director of the UIMATH Applelab (1983-1994), grafiXlab, (1995-2006), now the REU-Lab(2007- ).

Co-PI with Donna Cox, Renaissance Experimental Lab, NCSA (1989-2005).

Eisenhower grants for inservice teacher training, eighties and early nineties.

Taught Math 198 "Hypergraphics" freshman honors seminar in geometrical computation for the Campus Honors Program, (1990-2006).

Developed many undergraduate and graduate courses, chiefly for teachers training. Campus AMOCO award for excellence in undergraduate teaching (1994).

With Umesh Thakkar, 3 year summer REU programs "Audible Sketchpad for the CAVE" under NCSA PACI program, Award REU98-001.

IlliMath2001, 2002, 2004, 2006, summer REU programs under VIGRE and Workforce in Mathematical Sciences.

Co-PI "Teacher Retention and Renewal through Visualization and Immersive Technologies in Rural Education" 6/01/2002 - 11/30/2007 NSF 0138819.

PI "REU Site in Mathematics at UIUC" 5/15/2005-4/30/2008 NSF 0452048.

THESIS AND POSTDOCTORAL ADVISOR:

Prof. Charles Titus, Mathematics, University of Michigan.

RECENT COLLABORATORS:

Bernard, Ben (Amazon.com), Peter Brinkmann (CUNY), Jim Crowell (ISL UIUC), Camille Goudeseune (ISL UIUC), Chris Hartman (U Alaska), Hank Kaczmariski (ISL UIUC), Stuart Levy (NCSA UIUC), Paul McCreary (Evergreen College), Tony Robbin (New York), Benjamin Schaeffer (New York), John M. Sullivan (TUB Berlin), Jeffrey Weeks (Canton, NY).

RECENT PH.D. STUDENTS/POSTDOCS:

Alexei Bourd	Qualcomm, San Diego, CA	Ph.D. 2003	[differential equations]
Paul McCreary	Evergreen College, WA	Ph.D. 1998	[mathematical visualization]